

Validation of Standing Wave Liner Impedance Measurement Method, Phase I

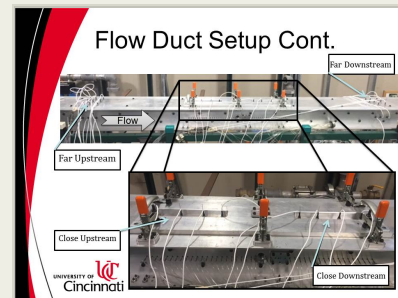
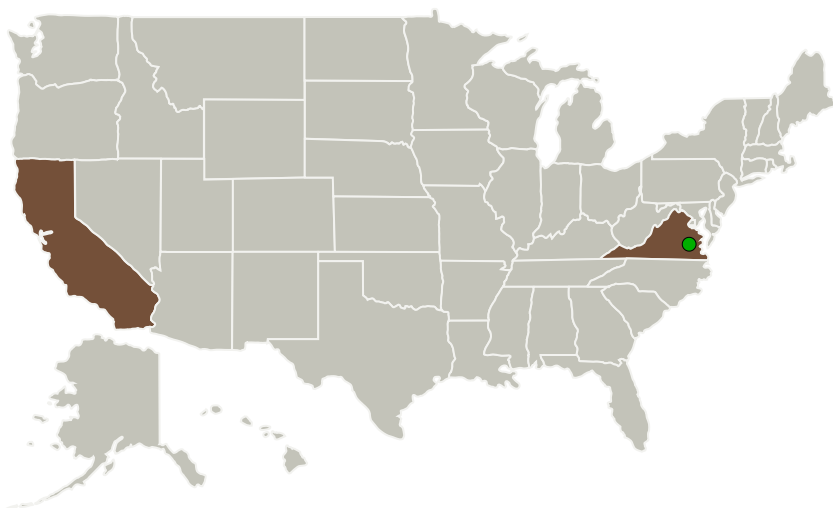
Completed Technology Project (2016 - 2016)



Project Introduction

Hersh Acoustical Engineering, Inc. proposes to establish the feasibility and practicality of using the Standing Wave Method (SWM) to measure the impedance of perforate-over-honeycomb liners exposed to both grazing and orifice bias flow. By measuring liner generated reflected sound in a duct, the SWM calculates the impedance of one or more rows of resonator liners, providing the liner axial length is small relative to the wavelengths of the incident sound and the sound frequencies are sufficiently low that the effects of acoustic refraction by mean flow velocity gradients are negligible. Work Plan. Tasks are separated into test preparation, test execution, and analysis and reporting. Tests will be conducted in the University of Cincinnati Grazing Flow Test Facility and most preparation work will be focused on modifying the facility to permit the enabling of bias flow in the facility. The facility design will be such to enable measurements of resonator impedance without grazing flow, with grazing flow and with grazing and bias flow. The following tasks are proposed. Task 1, Design of test resonator, Task 2, Quote, manufacture, and installation of test resonators, Task 3, Modification of test setup and data processing codes, Task 4, Impedance measurements with no grazing or bias flow, Task 5, Impedance measurement with grazing flow and no bias flow, Task 6, Impedance measurement with grazing flow and bias flow, Task 7, Measurement of resonator impedance in the UC acoustic wave tube, and Task 8, Final Report.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Hersh Acoustical Engineering, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Calabasas, California
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

California	Virginia
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Project Transitions

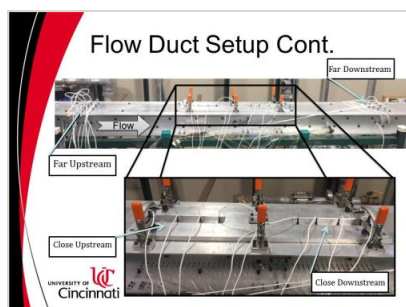
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

Closeout Documentation:

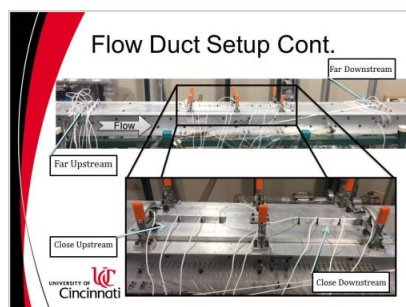
- Final Summary Chart(<https://techport.nasa.gov/file/139742>)

Images



Briefing Chart Image

Validation of Standing Wave Liner Impedance Measurement Method, Phase I
(<https://techport.nasa.gov/image/135376>)



Final Summary Chart Image

Validation of Standing Wave Liner Impedance Measurement Method, Phase I Project Image
(<https://techport.nasa.gov/image/134856>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Hersh Acoustical Engineering, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

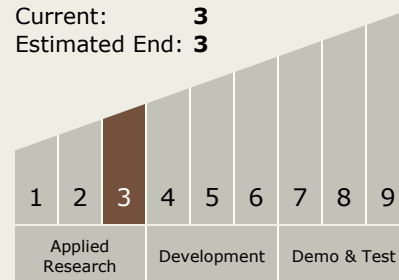
Carlos Torrez

Principal Investigator:

Alan S Hersh

Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.1 Aerodynamics

Target Destinations

The Sun, Earth, The Moon,
Mars, Others Inside the Solar
System, Outside the Solar
System